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NOTES AND LITERATURE.

ZOÖGEOGRAPHY.

The Atlantis-problem has been re-investigated from the zoögeographical side by Dr. R. F. Scharff.[1] Examining the land and fresh-water faunas of the present Atlantic islands (Canary islands, Madeira, Azores), he arrives at conclusions opposite to those of Wallace. Although he does not deny that there are instances which are apparently due to colonization of these islands by animals transported by winds, currents, etc., he is of the opinion that a large percentage of the fauna indicates that we do not have to deal with truly oceanic islands, but that they once were connected with present continents. He shows that there is reason to conclude that "Madeira and the Azores, up to Miocene times, were connected with Portugal; and that from Morocco to the Canary islands, and from them to South America stretched a vast land which extended southward certainly as far as St. Helena. This great continent may have existed already in Secondary times, as Dr. Ihering suggested; and it probably began to subside in early Tertiary times." Scharff further believes that the northern portions of this latter continent persisted until the Miocene, and that subsequently, in early Pleistocene, there was again a connection of the Atlantic islands with the Mediterranean countries (Africa and Europe).

These ideas admirably agree with those recently set forth by Ortmann,[2] at least as far as it concerns the connection of West Africa with South America, and it is quite interesting that both authors arrived at the same conclusions, as did others before them, namely: Suess (1888), Neumayr (1890), and von Ihering (1891).

A. E. O.

Zoögeographical Development of the Indo-Australian Archipelago has been made the object of a special investigation by Professor Max Weber[3]). He arrives at certain very important conclusions, which seem well supported, at any rate they are better supported than the previous very general theories concerning these parts. We may summarize them here as follows.

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[1] Scharff, R. F. Some remarks on the Atlantis Problem, in *Proc. R. Irish Acad.* vol. 24, sect. B, part 3, 1903, pp. 268–302.

[2] *Proc. Americ. Philos. Soc.* vol. 41, 1902, p. 348, ff.

[3] Weber, Max. *Der Indo-australische Archipel und die Geschichte seiner Tierwelt.* Jena, Fischer, 1902. 46 pp., map.

1. We are to abandon Neumayr's theory of a large Jurassic Sino-Australian continent. Sufficient evidence has been brought forward to show that at least a large part of the present Indo-Australian region was covered by sea in Jurassic times, and, moreover, that this sea was by no means a shallow one.

2. Zoölogical evidence supports the view of a continental connection of Asia and Australia during Cretaceous times. As to the size and shape of this connection we possess hardly any indications: we know that certain parts of the Archipelago were land during this period, while marine deposits are known from other parts.

3. During the Cretaceous, and pre-eminently so during the Tertiary, this region was characterized by frequent changes, but during all these times it was a region if not of continental character, certainly of that of a shallow sea with many islands.

4. Wallace's line, a depression between Borneo and Celebes, and said to be continued between Bali and Lombok, does not exist as a zoögeographical boundary between Asia and Australia. Between Bali and Lombok, it does not exist at all, the sea being very shallow there. There is indeed a depression between Borneo and Celebes, but this does not separate Asiatic and Australian faunal development Celebes possessing Asiatic elements in a high percentage. Nevertheless, Wallace's line holds good for a separation of Celebes from Borneo, the former having received the oriental constituents of its fauna not from Borneo, but from the Philippine islands.

5. The three larger Sunda islands (Sumatra, Java, Borneo) were connected with one another and with the Asiatic continent in Pliocene times. The separation of these islands was not contemporaneous: Java was isolated first, and Sumatra last.

6. Borneo was also united, at about the same time, with the Philippine islands and South China.

7. The smaller Sunda islands (Bali, Lombok, Sumbawa, Flores) form a continuation of Java, possessing a fauna which in part is Oriental, and in part Australian. The Australian elements possibly arrived by way of Timor, which shows closer affinities to Australia, and, no doubt, once was part of this continent.

8. Celebes was always separated from Borneo (beginning in the Miocene), but it was connected with the Philippine islands on the one side, and with Java and the smaller Sunda islands (Flores) on

the other. This accounts for its oriental elements. It possesses also an eastern (Australian) faunal element, and this is explained by a former connection by land with New Guinea by way of the Sula islands, Buru and Ceram.

9. New Guinea, Aru, and Ki islands once formed part of the Australian continent in Tertiary times. Temporarily connected with this were the islands of Ceram, Misol, Waigeu, and Halmahera. The Banda sea is a depression formed in Miocene times.

The general conclusions of M. Weber are given by himself in the following words (translated) (pp. 41–43):

"In Pre-Tertiary, possibly in Cretaceous times, Asia and Australia were connected by a land mass. Eurasiatic types of animals popuated this land, which subsided during the Eocene, and was dissolved, into a southeastern portion: present Australia and New Guinea where Monotremata, Marsupials, and ancient types of other groups of animals were preserved, Cassowaries, Birds of Paradise developed, while groups or universal distribution, as for instance Woodpeckers and Sparrows, were not able to reach these parts. Toward the North, a shallow coral sea extended, in which a few elevated parts were present as islands, and possibly offered a refuge to a few older forms of life like Cuscus, primitive Rodents, Insectivors, and others.

"Important changes took place in the Miocene: on the one hand deep depressions were formed in the shallow sea, and on the other hand stretches of land became dry, like Celebes, while in the western parts continental conditions were formed, which offered opportunities for the dispersal of Asiatic animals, such as we know from the Siwalik beds of India. Meanwhile new changes of level took place within this unstable part of the earth's crust, which brought about, by the end of the Pleistocene, the present configuration of the archipelago. These processes caused the local disappearance of that old Tertiary fauna, with the exception of a few relicts, while the immigration of modern Asiatic types was favored. This immigration was of longest duration for the greater Sunda islands, of which Java was the first to become isolated. The fauna of these islands, consequently, resembles most that of Asia. Toward the East, a mixed fauna prevails, and the Asiatic types disappear gradually in this direction, while Australian types become more frequent. This mixed fauna forms a broad transitional zone between the greater Sunda islands and the Philippines on the one side, and Australia, including New Guinea, the Aru and Ki islands, on the other. The faunal elements of this region are of different origin. Celebes preserved some older Asiatic types, which came probably by way of the Philippine islands. Younger Asiatic immigrants arrived in Celebes by way of Java, and the smaller Sunda islands, but not directly from Borneo, the old Strait of Makassar separating it from this island, which also received immigrants from the Philippines, and sent others in turn to them, from whence they were able to find their way to Celebes.

"In addition, the fauna of Celebes received Australian types from the Moluccas, where they were in part relicts, in part later immigrants from Australia. Possibly also the smaller Sunda islands received a few immigrants from this latter continent."

A. E. O.

BOTANY.

Influence of Light and Darkness on growth and Development.[1] — In this work is presented one of the most important, if not the most important, single piece of research in plant physiology yet published in this country. It is a record of a series of extensive experiments covering several years (1895–1902), from which important generalizations have been drawn. Heretofore too much of the general principles laid down regarding the influence of light upon plants has been based upon experiments with a comparatively limited number of forms. It was the author's intention to avoid these errors and for this reason he selected representative plants covering a wide field in both relationship and form. No fewer than ninety-seven forms were experimented with, and etiolated for an often long period of time. These forms include very diverse orders of plants and comprise practically every form of the plant body of importance. Various typical and modified forms of stems, including those of succulents and xerophytes, the different types of foliar organs and various floral structures were investigated. A very careful and detailed account of the histology of the different etiolated tissues, in comparison with the normal, is also included.

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[1] MacDougal, D. T. The influence of Light and Darkness upon Growth and Development. *Memoirs New York Botanical Garden.* vol. ii. Jan. 20, 1903, pp. i–xiii,—1–319, 176 figures.